

Science and Integrated Drainage Basin Coastal Management

Chesapeake Bay and Mississippi Delta

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ABSTRACT

Modern precepts of coastal management involve three challenging dimensions: integration, sustainability, and adaptation. The extent to which management addresses these dimensions is examined for two large coastal ecosystems heavily influenced by extensive continental drainage basins: the Chesapeake Bay and the Mississippi delta. The Chesapeake Bay, the largest estuary in the U.S.A., has been affected by eutrophication, habitat loss, and overfishing. Its biggest challenges are the control of diffuse sources of nutrient inputs from agriculture and expanding urban–suburban development and the physical restoration of once plentiful oyster habitats. The Mississippi delta is experiencing rapid loss of coastal wetlands and eutrophication of the adjacent Gulf of Mexico. River controls for navigation and flood protection and the world’s most intense industrial agriculture in the upper basin affect this ecosystem greatly. Although assessments and models of nutrient dynamics in the watershed and coastal waters provide a foundation for intermedia and interdisciplinary integration, the management of both systems is not yet well integrated among sectors (e.g., fishing, transportation, and agriculture) and issues (e.g., eutrophication, overfishing, and habitat restoration). While the development of management goals is further advanced in the Chesapeake, even there a scientifically realistic vision of a sustainable future has not been developed. Management of the Chesapeake Bay is adaptive in the long term, but lacks the tight connections between models and outcomes needed for highly responsive adaptive management. Science could better serve integrated coastal management in these regions if it included: interdisciplinary and strategic research targeted to the coastal ecosystem and its watershed; more predictive approaches involving historical reconstruction, models, and experiments; more effective integration of modeling, monitoring, and research; and institutional and individual commitment to civic science.